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XVI. *On the Ova of the different tribes of Opossum and Ornithorhynchus.* By Sir Everard Home, Bart. V. P. R. S.

Read March 25, 1819.

Now it is determined that the ova of quadrupeds in general are formed in corpora lutea, and that in all such animals the ova become attached to the uterus, and by this means the foetus receives its support and increase; we are enabled to ascertain the modes of formation of the ova of the opossum tribes, which from the want of this previous knowledge have not been investigated with the smallest degree of success. This becomes the best apology that can be made for the failure of every former attempt.

In this enquiry it will be found, that the ova of all the animals of these tribes are not formed in the same manner, and that the differences met with, make two distinct links between quadrupeds in general and the ornithorhynchi; these again approach so nearly to the bird, as to complete the links of gradation between the human species and the feathered race, so far at least, as concerns their mode of generation.

The mode of formation of the ova in the kangaroo, constitutes the first link in this beautiful series.

In the kangaroo, Mr. BAUER has found the corpus luteum, similar to that in quadrupeds; it is represented in the annexed drawing. Indeed it is to Mr. BAUER's talents and microscopical observations that we are indebted for all our information upon this subject.

In the kangaroo, the ovum when expelled from the corpus luteum, passes along the Fallopian tube, and as there is a thickening and glandular structure surrounding the portion of the tube next to its termination in the uterus, it is there that the yelk, or something analogous to it, is probably secreted ; the ovum with the newly acquired yelk, drops from a pendulous opening into the uterus, in which it receives the albumen. In one specimen the uterus in a pregnant state, came under my observation ; but as it was sent from New South Wales, in spirit which had not been timely renewed, the contents of the uterus were reduced to a confused mass, in which only a part of the bones could be made out ; enough was however seen, to determine that the ovum of the kangaroo in the uterus has an abundant supply of albumen. There was no attachment whatever between the albumen and the uterus. There are two lateral canals that communicate between the uterus and vagina : these answer the purpose of aerating the foetus by means of atmospheric air.

As the penis of the male has only one orifice at the point adapted to the os tincæ, the ovum must of necessity be impregnated in the uterus, the structure of the Fallopian tubes, and their mode of terminating in the uterus, rendering it impossible for the semen to pass into them.

The foetus, as soon as it arrives at a certain size (at which time it in general weighs about 12 grains,) is expelled from the uterus, and is received into the marsupium, where it becomes attached to the point of one of the nipples, at first by simple contact ; but as the foetus grows, the nipple is found farther in the mouth upon the surface of the tongue. In the 85th volume of the Philosophical Transactions, Plate XVIII. XIX. XX. and XXI. and in the 100th volume, Plate XIII. most of

these circumstances are represented, but the uses of the different parts, I readily confess, I was at that time unable accurately to comprehend.

The mode of formation of the ova in the Koli and the Wombat of New South Wales, and in the great and small Opossum of North America, constitutes the second link in this chain of gradation.

In none of these different genera are there corpora lutea in the ovaria, but in their place a certain number of yelk-bags of different sizes ; and these are so completely imbedded in the substance of the ovarium, that to common observation they appear to be so many corpora lutea. There is no thickened glandular structure surrounding the Fallopian tubes near their termination in the uterus. Instead of one uterus having two Fallopian tubes, there are two uteri and one tube to each ; and in proof that the ovum in each uterus is impregnated separately in its own cavity, the point of the penis in the male is so formed as to throw the semen into both. The lateral tubes, by which the foetus is aerated in the kangaroo, are formed in these genera in a different manner ; there is only one to each uterus, and this, instead of communicating with the uterus at the fundus, opens into it at the cervix. The yelk-bags are shown in the annexed drawing. I have not had an opportunity of examining the ovum of any of these animals in utero, but Mr. BELL, a very intelligent surgeon, transmitted an account to Sir JOSEPH BANKS, of the dissection of a female koli, in which he met with an imperfectly formed embryo in each of the uteri, surrounded by a mass of albumen. The young of all these genera are expelled from the uterus into the marsupium, and become attached to the prominent points of the nipples.

The mode of formation of the ova in the ornithorhynchi, constitutes the intermediate link between that of the American opossum and the bird.

The yelk-bags in the ovaria of the ornithorhynchi are more distinct, and less deeply imbedded than in the opossum : there is no regular uterus, nor Fallopian tubes ; the yelk-bags pass along an oviduct, the lower part of which performs the office of a uterus. In this situation the ova are impregnated ; the penis of the male, which is bifid, throwing the semen into both oviducts at the same time, through several points like a watering pot, so as to scatter it all over the cavity. The ova are aerated by the vagina. The ova in a magnified state are represented in the annexed drawing. The organs of generation are figured in the 92nd volume, Plate IV. of the Philosophical Transactions. To show that the yelk-bags in the ornithorhynchus resemble those of the pullet, a magnified drawing of them made by Mr. BAUER in that bird, is annexed.

To those members not conversant in comparative anatomy, the following summary may be acceptable.

In the human species, and quadrupeds in general, the ova are formed in corpora lutea, and pass into the uterus, to the sides of which they become attached ; when the foetus is completely formed it is expelled by the vagina, and afterwards sucks the mother.

In the kangaroo the ova are formed in corpora lutea, receive their yelks in the Fallopian tube, and their albumen in the uterus. The ovum thus completed, is impregnated in the uterus, aerated by means of lateral tubes, and when the young is expelled from the uterus, it is received into the marsupium, and attached to the nipple of the mother.

In the American opossum, the yelk bags are formed in the ovaria; pass into the uteri, there receive the albumen, and are then impregnated; the foetus in each uterus is aerated by one lateral tube. When expelled from these uteri, the young are received into the marsupium, and become attached to the nipples of the mother.

In the ornithorhynchi the yelk-bags are formed in the ovaria; received into the oviducts, in which they acquire the albumen, and are impregnated afterwards; the foetus is aerated by the vagina, and hatched in the oviduct, after which the young provides for itself, the mother not giving suck.

In the pullet, the yelk-bags are formed in one ovary, impregnated in one oviduct, and hatched out of the body.

EXPLANATION OF THE PLATES.

PLATE XVI.

Ovarium of the Kangaroo.

Fig. 1. The ovary of a young kangaroo laid open: natural size; showing the corpus luteum.

Fig. 2. The same section magnified four diameters, to show the corpus luteum more distinctly.

Fig. 3. A section of the corresponding ovary of the same kangaroo, magnified four diameters; to show an incipient corpus luteum.

Fig. 4. A similar section of the ovary of an old kangaroo: natural size; in which there are two corpora lutea.

Fig. 5. The same section, magnified four diameters,

PLATE XVII.

Ovarium of the American Opossum.

Fig. 1. Front view of the ovarium of the large American opossum : natural size.

Fig. 2. The same view, magnified five diameters.

Fig. 3. Back view, magnified five diameters.

Fig. 4. A perpendicular section, magnified five diameters.

Fig. 5. The same section, magnified ten diameters.

Fig. 6. A young yelk-bag, magnified twenty diameters.

Fig. 7. A full grown yelk-bag, magnified twenty diameters.

Fig. 8. A full grown yelk-bag opened, to show its contents ; magnified twenty diameters.

PLATE XVIII.

Ovarium of the Ornithorhynchus Paradoxus.

Fig. 1. Front view of the ovarium of the ornithorhynchus paradoxus : natural size.

Fig. 2. The same view, magnified five diameters.

Fig. 3. Back view, magnified five diameters.

Fig. 4. A small portion cut off from the upper end of the left side of Fig. 3. ; magnified ten diameters.

Fig. 5. An internal view of the same portion, magnified ten diameters, to show the yelk-bags.

Fig. 6. A full grown yelk-bag, magnified twenty diameters.

Fig. 7. A young yelk-bag opened, to show its contents : magnified twenty diameters.

Fig. 8. A full grown yelk-bag opened, to show its contents : magnified twenty diameters.

Fig. 9. The globules of the yelk diluted with water, magnified four hundred diameters.

PLATE XIX.

Ovarium of the Hen.

Fig. 1. Front view of the ovarium of a hen : natural size.

Fig. 2. A small portion of the same, with some very young yelks : natural size.

Fig. 3. The same small portion, magnified five diameters.

Fig. 4. Back view of the ovarium of the hen : natural size.

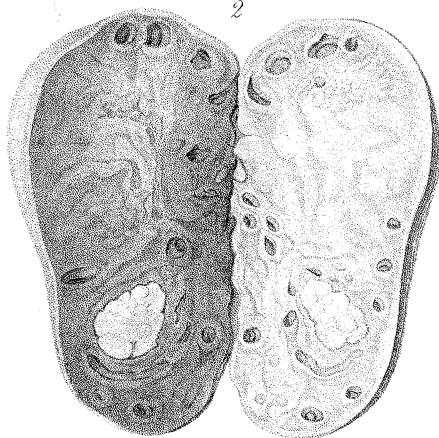
Since this Paper was sent to the press, the author has received, through the kindness of GOVERNOR MAC QUARRIE and Sir JOHN JEMISON, four specimens of female *Ornithorhynchi Paradoxi* from New South Wales, and finds in all of them, as well as in every other specimen that has come under his observation, that there are yelk-bags only in the left ovarium, showing that both ovaria are not generally in use at the same time. This is an approach to the bird, in which there is only one, lying on the left side.

In the chick of the common fowl before it is hatched, there is a small portion of an oviduct on the right side, but this disappears before the chick is completely formed.

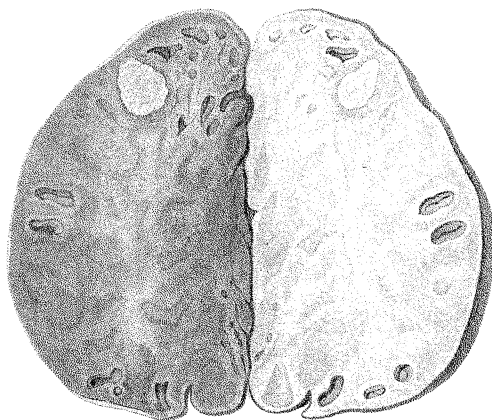
Fig 1



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